UNIVERSAL ANGLE JIG

Technical Field

The present invention relates to a universal angle jig and more particularly to a jig capable of making easy and accurate measurements of arbitrary angles.

Background Art

Typical Japanese houses are provided with a gable roof with verge rafters attached in the form of a mountain. For constructing such verge rafters, boards are obliquely cut at their ends and two rafter boards are fit to each other at their obliquely cut ends to be fixed to a gable.

With respect to a crown molding between a wall surface and a ceiling and a skirting board between a wall surface and a floor board in the construction of the interior of a room, two components of a crown molding or skirting board are fixedly fit to each other at their obliquely cut ends at a corner of the room.

If the oblique cutting of ends of board materials in the construction of such verge rafters, crown moldings or skirting boards is done by a carpenter depending on his sense, a gap would be created between the joint surfaces of the two components of a verge rafter, crown molding or skirting board, resulting in marring of the appearance.

A carpenter's square 10 such as shown in Figure 1 is often used for determining the proper angles of cuts for various members in the construction of a house etc. However, the angle that can be measured by the carpenter's square 10 is limited to fixed angles of 45°, 90° and 135°. In recent years, roofs are sometimes constructed in special form and houses are sometimes built on an

irregular-shaped (complicated-shaped) land. In these cases, the carpenter's square 10 cannot make desired angle measurements.

As an attempt to cope with such cases, a universal square 20 has been put to practical use, which has a long ruler and a short ruler coupled at their ends so as to swivel relative to each other. For example, where the proper angle of cuts for verge rafters is determined using the universal square 20, the following procedure is taken: the two rulers of the universal square 20 are opened as shown in Figure 3(a) and held to a gable defined by roof boards 50 as shown in Figure 3(b); two straight lines 21 which make the angle of the gable roof are traced on a paper by the two rulers as shown in Figure 3(c); points 22 on the straight lines 21, which are equidistant from the intersection of the straight lines 21, are obtained; circular arcs having the same radius are drawn with their respective centers at the points 22 to obtain the intersections 23 of the circular arcs; a straight line 24 connecting the intersections 23 is drawn; the angle between either one of the straight lines 21 and the straight line 24 is measured to obtain one-half the angle of the gable defined by the roof boards 50, thereby determining an oblique angle (cutting angle) for the verge rafters to be cut.

Alternatively, an oblique angle (cutting angle) for verge rafters may be obtained such that: as shown in Figure 4, a plumb bob 25 is suspended from the intersection of the roof boards 50; the long ruler of the universal square 20 is fit to the plumb bob 25 while the short ruler being held to one of the roof boards 50; and the angle made by the long and short rulers is measured to determine the oblique angle.

The measurement of an arbitrary angle by use of the conventional universal square 20, however, is disadvantageous in that not only an extremely

troublesome procedure is involved but also use of the plumb bob 25 is required in order to obtain one-half the internal corner angle, and that the plumb bob 25 can be used only when the corner having an internal corner angle opens in a vertical direction.

Disclosure of the Invention

The invention is directed to overcoming the above problems and a primary object of the invention is therefore to provide a universal angle jig capable of making easy and accurate measurements of arbitrary angles and one-half the arbitrary angles.

According to the invention, there is provided a universal angle jig comprising:

a pair of first rulers each having a linear portion at least at a part thereof and being pivotally supported at any position along the linear portions so as to be freely pivotable relative to each other;

a pair of second rulers each having a linear portion at least at a part thereof, being pivotally supported at any position along the linear portions so as to be freely pivotable relative to each other, and being pivotally coupled to the first rulers respectively, so that a parallelogram having four sides of equal length is defined by connecting four pivotal axes with straight lines; and

a reference ruler having a linear portion at least at a part thereof, supporting the pivotal axes for the pair of fist rulers and for the pair of second rulers such that said two pivotal axes are respectively coupled to positions along the linear portion of the reference ruler, and permitting at least either one of said two pivotal axes to freely move in a direction along a diagonal line of the

parallelogram,

wherein one or more angles, which are among an angle formed by the pair of first rulers, an angle formed by the pair of second rulers, and an angle formed by the reference ruler and either one of the first rulers or one of the second rulers, are specified as angles to be obtained.

One of the aspects of the invention resides in the point that two pairs of rulers (the first rulers and the second rulers) are pivotally coupled to one another such that a parallelogram having four sides of equal length is formed by connecting the four pivotal axes with straight lines, whereby the parallelogram is deformable within a plane while remaining in its parallelogrammatic configuration, and that a reference ruler is provided at a position corresponding to the position of a diagonal line of the parallelogram, passing through the pivotal axis (vertex) for the pair of first rulers and the pivotal axis (vertex) for the pair of second rulers, so that the parallelogram is supported by the reference ruler.

The means of supporting the parallelogram by the reference ruler can take any form provided that it meets the condition in which at least either of the above vertexes is freely movable in the direction of the diagonal line of the parallelogram.

With the above arrangement, an arbitrary angle can be obtained by using the pair of first rulers or the pair of second rulers or using either one of the first rulers and either one of the second rulers. In addition, since the angle formed by the reference ruler and either one of the first rulers or either one of the second rulers is always equal to one-half the angle formed by the pair of first rulers or one-half the angle formed by the pair of second rulers, a half of an arbitrary angle can be easily, reliably obtained simply by setting the first or second rulers at the

arbitrary angle.

While the universal angle jig of the invention can exert great effects when used for applications similar to those of the conventional universal squares, it may be used for other applications. For instance, it may be mounted on a cutter as a jig to be utilized in cutting of metallic materials or other materials at desired angles.

The reference ruler, the first rulers and the second rulers are linear at least partially in order that they function as a ruler. Although the function of the universal angle jig of the invention can be achieved, for example, by making the outer side edges of the first and second rulers linear and making either of the side edges of the reference ruler linear, it is preferable, in the view of their appearances and easiness to handle, to make both side edges of these rulers linear.

The material of the reference ruler and the first and second rulers is not particularly limited but it is preferable, in the light of wear resistance, strength and others, to use a metallic material such as aluminum (or aluminum alloys) or stainless steel; a relatively hard synthetic resin material; or combinations of them. Where the universal angle jig of the invention is used as a jig for a cutter as described earlier, a wear-resistant plate made from a super hard material may be attached to a part of the universal angle jig with which the cutting edge of the cutter comes into contact.

In the universal angle jig of the invention, the movement of at least either one of two vertexes, one being formed by the pair of first rulers (the pivotal axis for the pair of first rulers) whereas the other is formed by the pair of second rulers (the pivotal axis for the pair of second rulers), in the direction of the diagonal line may be permitted and restrained freely, so that the above parallelogram can be

easily fixed at a given angle. Fixing of the parallelogram can also be carried out by freely permitting and restraining the pivotal movement of at least either the pair of first rulers or the pair of second rulers. In any case, the parallelogram can be kept in the same state by restraining the movement of at least any one of the pivotal axes or restraining the pivotal movement of at least any one of the first and second rulers. It should, however, be noted that more reliable fixing can be achieved by restraining the movements of a plurality of members among them at the same time.

As a concrete means for carrying out the above permission/restraint, a pressing lever for pinching and pressing the first or second rulers may be used.

Another concrete form of the permission/restraint means is such that the pivotal axis for the pair of first rulers and/or the pivotal axis for the pair of second rulers is formed from an external thread and this external thread is tightened by an internal thread together with the first or second rulers.

Additionally, in the universal angle jig of the invention, the reference ruler is provided with angle scale indicia for indicating the position of the vertex formed by the pair of first rulers (the pivotal axis for the pair of first rulers) and/or the vertex formed by the pair of second rulers (the pivotal axis for the pair of second rulers) which is movable according to an objective angle to be obtained. In this case, the universal angle jig can be utilized as the so-called "bevel square" which measures an objective angle by reading a scale division pointed out by a mark applied to either one of the pivotal axes. The above angle scale indicia should be variable pitch indicia and may be designed to indicate not only angles but also ratios that express roof slopes (pitches).

Further, the universal angle jig of the invention is designed such that the

pivotal axis for the first rulers and/or the pivotal axis for the second rulers is supported so as to be freely slidable along a guide groove in the direction of the diagonal line, the guide groove having uniform width and being provided for the reference ruler. In this structure, the pivotal axis(axes) is configured to slide without rattling relative to the guide groove, thereby eliminating the risk that the pivotal axes supporting the first and second rulers respectively topple to the guide groove, so that the arbitrary angle and one-half the arbitrary angle can be accurately obtained.

In the universal angle jig of the invention, since it is desirable to turn the reference ruler and the first and second rulers in desired directions and to utilize their width-wise edges, each ruler is preferably uniform in thickness and width in a direction along its linear portion.

In addition, the universal angle jig of the invention is such that, either the pair of first rulers or the pair of second rulers extend beyond a coupling point at which the first or second rulers are pivotably coupled to each other, whereby when the reference ruler is brought into contact with an objective member to be marked as a reference line and marking is carried out along one of the rulers (one of the first rulers or one of the second rulers) which extend beyond the above coupling point, sufficient length for marking can be assured so that it becomes possible to mark cut lines on members having great width.

Further, the universal angle jig of the invention is such that, the pair of rulers (the first or second rulers) which extend beyond their coupling point are substantially twice the other pair in length, whereby when the first and second rulers are collapsed in a longitudinal direction of the reference ruler, they can be accommodated within the space corresponding to the length of the reference ruler,

which contributes to convenient storage and carrying.

Brief Description of the Drawings

Figure 1 illustrates one example of the structure of a conventional carpenter's square.

Figure 2 illustrates one example of the structure of a conventional universal square.

Figures 3(a) to 3(c) diagrammatically show a method of using the universal square shown in Figure 2.

Figure 4 diagrammatically shows another method of using the universal square shown in Figure 2.

Figure 5 illustrates a universal angle jig according to a preferred embodiment of the invention, wherein Figure 5(a) is a front elevation and Figure 5(b) is a back elevation.

Figure 6 is an exploded perspective view illustrating a structure of an essential part of the universal angle jig shown in Figures 5(a) and 5(b), and illustrating a part (where a pair of first or second rulers are overlapped with each other) nearby a pivotal shaft at the leading ends of the pair of first rulers or at the trailing ends of the pair of second rulers.

Figure 7 illustrates a reference ruler of the universal angle jig shown in Figures 5(a) and 5(b) and one form of scale indicia provided for the reference ruler.

Figure 8 diagrammatically shows a method of using the universal angle jig shown in Figures 5(a) and 5(b).

Figure 9 diagrammatically shows another method of using the universal

angle jig shown in Figures 5(a) and 5(b).

Figure 10, comprised of Figures 10(a) and 10(b), illustrates a structure of a universal angle jig according to another embodiment, wherein Figure 10(a) is a front elevation and Figure 10(b) is a back elevation.

Figure 11 diagrammatically shows a method of using the universal angle jig shown in Figures 10(a) and 10(b).

Figure 12 diagrammatically shows another method of using the universal angle jig shown in Figures 10(a) and 10(b).

Best Mode for Carrying Out the Invention

First Embodiment

Referring now to the accompanying drawings, the invention will be hereinafter described in details according to its preferred embodiments.

Figures 5 to 9 show a first preferred embodiment of the universal angle jig of the invention. As shown in Figures 5(a) and 5(b) which illustrate the universal angle jig of the first embodiment in its stored condition, the universal jig has, in combination, (i) a long reference ruler 110; (ii) a pair of first rulers 120 that are slightly shorter than the reference ruler 110; and (iii) a pair of second rulers 130 that have length substantially one-half the length of the first rulers 110.

It should be noted that, in the description of the present embodiment, for simplicity, the upper and lower sides of the jig shown in Figures 5(a) and 5(b) are referred to as "leading end" and "trailing end" respectively, and the side shown in Figure 5(a) is referred to as "front side" while the side shown in Figure 5(b) is referred to as "rear side".

As shown in Figures 5(a) and 5(b), the reference ruler 110 is made from an

aluminum alloy or an ABS resin containing glass fiber kneaded thereinto and has uniform thickness and width throughout its entire length in a longitudinal direction, with both side edges being linear and both ends rounded into an circular arc shape. The reference ruler 110 has a guide groove 111 at its center, the guide groove 111 having uniform width and extending substantially throughout the entire length of the reference ruler 110 in a longitudinal direction.

The first rulers 120 are also respectively made from an aluminum alloy or an ABS resin containing glass fiber kneaded thereinto and have uniform thickness and width throughout their entire length in a longitudinal direction with both side edges being linear and both ends rounded into a circular arc shape. Formed at the leading ends of the pair of first rulers 120 are insertion holes 143a, 144a (see Figure 6). At the intermediate parts of the first rulers 120, small-diameter screw holes (i.e., helically threaded holes 131 for screws 131 described later) are formed.

The second rulers 130 are also respectively made from an aluminum alloy or an ABS resin containing glass fiber kneaded thereinto and has uniform thickness and width throughout their entire length in a longitudinal direction with both side edges being linear and both ends rounded into a circular arc shape. The second rulers 130 have length substantially equal to the distance between the insertion holes 143a, 144a and small-diameter screw holes of the first rulers 120. Each second ruler 130 has, at its leading end, an insertion hole (i.e., a screw hole for the screw 131 to be described later) corresponding to its associated small-diameter screw hole described above and has, at its trailing end, an insertion hole 143b (144b) (see Figure 6) similar to the insertion holes 143a, 144a of the first ruler 120.

As seen from Figure 6, the overlapped portion (at the leading end) of the

first rulers 120 and the overlapped portion (at the trailing end) of the second rulers 130 have the same shape and are halved in thickness so that the thickness of the whole universal angle jig is not excessively increased and the rear surfaces of the two pairs of linear rulers 120 and 130 are substantially flush with each other.

As shown in Figure 6, a sliding piece 140a is inserted, from the underside of the reference ruler 110, through the leading end of the guide groove 111 of the reference ruler 110 and through the insertion holes 143a, 144a defined at the leading ends of the pair of first rulers 120 which are overlapped with each other. The sliding piece 140a assumes the form of a pin designed so as not to slip off upwardly. The sliding piece 140a has, at its leading end, an external thread portion 145a which is, in turn, screwed into an internal thread 141 with the pair of first rulers 120 held between. The pin-shaped head (the lower part in Figure 6) of the sliding piece 140a is cut away at the right and left sides such that the right and left cut faces are parallel with each other and the width of the cut-away part of the pin-shaped head coincides with the width of the guide groove 11. This allows the sliding piece 140a to freely slide within the guide groove in a longitudinal direction without rattling.

A similar sliding piece 140b is inserted from the underside of the reference ruler 110 through the trailing end of the guide groove 111 and through the insertion holes 143b, 144b defined at the trailing ends of the pair of second rulers 130 which are overlapped with each other. The sliding piece 140b has, its leading end, an external thread portion 145b which is, in turn, screwed into an internal thread 141b with the pair of second rulers 130 held between.

Laid over the middle point of each first ruler 120 viewed in a longitudinal direction is the leading end of the corresponding one of the second rulers 130

which have length one-half the length of the first rulers 120 as has been described earlier. The screw 131 is inserted into the insertion hole (not shown) of each second ruler 130 and screwed into the aforesaid small-diameter screw hole of each first ruler 120. In this way, the first rulers 120 and the second rulers 130 form a parallelogram the four sides of which are substantially equal to one another, and are coupled to one another so as to be relatively pivotable while being kept in the form of the parallelogram having four sides of equal length.

In the first embodiment, as shown in Figures 5(a) and 5(b), the distance between the leading ends (corresponding to the position of the sliding piece 140a) of the first rulers 120 and the trailing ends (corresponding to the position of the sliding piece 140b) of the second rulers 130 is set slightly shorter than the length of the guide groove 111 in a longitudinal direction, when the first rulers 120 and the second rulers 130 are fully closed. Accordingly, either the leading ends of the first rulers 120 or the trailing ends of the second rulers 130 can be positioned on their associated end of the reference ruler 110 by sliding the reference ruler 110 relative to the sliding pieces 140a, 140b when the jig is in the full closed condition.

As illustrated in Figure 5(b) and the enlarged view of Figure 7, the rear surface (underside) of the reference ruler 110 has scale indicia 112a for indicating the angle between the first rulers 120 on one side edge (i.e., the left side in Figure 7) of the guide groove 111 and scale indicia 112b for indicating the angle between the second rulers 130 on the other side edge (i.e., the right side in Figure 7). The scale indicia 112a, 112b are the same scale indicia except that their scale divisions increase in directions opposite to each other. For instance, they may be designed to indicate the range of from 20 degrees to 170 degrees as shown in Figure 7.

Another type of scale may be added which is calibrated with "slopes" such as numerals "2 to 12" as shown in Figure 7. It should be noted that "slopes" are used for indicating the slopes(pitches) of roofs as fractions represented by "height/base" in which the denominator is 10.

The right and left sides of each sliding piece 140a (140b) are respectively provided with a notch 142a(142b) that corresponds to the scale indicia 112a (112b) and indicates the sliding position of the sliding piece 140a (140b) (see Figures 5(b) and 6).

For example, where verge rafters are constructed, using the universal angle jig of the above structure according to the first embodiment as shown in Figures 8(a) to 8(d), the leading ends of the first rulers 120, that is, the sliding piece 140a inserted therein is allowed to slide so as to be positioned on the leading end of the reference ruler 110 (at that time, the internal thread 141a of the first rulers 120 is slightly tightened), and then, the pair of first rulers 120 are opened to be fit to the roof boards 50 such that the angle formed by the first rulers 120 becomes coincident with the angle of the gable enclosed by the roof boards 50 as shown in Figure 8(a). At that time, the trailing ends of the pair of second rulers 130 slide backwards along the guide groove 111 of the reference ruler 110, while the pair of first rulers 120 and the pair of second rulers 130 being kept in the form of parallelogram described earlier. By tightening the internal thread 141a of the first rulers 120 and the internal thread 141b of the second rulers 130 with the first rulers 120 being fit to the gable defined by the roof boards 50, the parallelogram formed by the first rulers 120 and the second rulers 130 can be fixed.

As shown in Figure 8(b) and Figure 8(c) which is a view taken in the direction of the white arrow of Figure 8(b), one side edge of the reference ruler

110 is fit to a side face of a board material 60 for a verge rafter. In this condition, a cut line is marked on the board material 60 along the outer edge (or inner edge) of one of the first rulers 120. Note that the rear surfaces of the first rulers 120 and the second rulers 130 are substantially flush with each other as discussed earlier, so that they can be closely fit to one side of the board material 60.

Then, the board material 60 is cut along the cut line. Since the angle formed by the pair of first rulers 120 is equal to the angle of the gable defined by the roof boards 50 and the angle formed by the reference ruler 110 and one of the first rulers 120 is one-half the angle formed by the pair of first rulers 120, the end of the board material 60 can be slanted at an angle that is one-half the angle of the gable. Another board material 60 is similarly cut. When butting the slant ends of the board materials 60 together, the board materials 60 are fit to each other without a gap, forming an angle coincident with the angle of the gable, as shown in Figure 8(d).

In the condition shown in Figure 8(a), the scale division 112a pointed by the notches 142b of the sliding piece 140b located at the trailing end is read from the rear side, thereby obtaining the angle formed by the pair of first rulers 120.

It should be understood that internal corner angles and half internal corner angles in other cases than the case described above can be readily measured with high accuracy in the similar manner.

As shown in Figures 9(a) and 9(b), when measuring an external corner angle, the trailing ends of the second rulers 130, that is, the sliding piece 140b inserted therein is allowed to slide so as to be positioned at the trailing end of the reference ruler 110 (at that time, the internal thread 141b of the second rulers 130 is slightly tightened), and then, the first rulers 120 and the second rulers 130 are

opened and set such that the angle formed by one of the first rulers 120 and one of the second rulers 130 which are positioned on the same side (the right side in Figure 9(a)) coincides with the external corner angle 70 of a corner as illustrated in Figure 9(a). At that time, the leading ends of the pair of first rulers 120 slide forwards along the guide groove 111 of the reference ruler 110, while the pair of first rulers 120 and the pair of second rulers 130 being kept in the form of parallelogram described earlier. By tightening the internal thread 141a of the first rulers 120 and the internal thread 141b of the second rulers 130 with the first ruler 120 and the second ruler 130 being thus fit to the corner having the external corner angle 70, the parallelogram formed by the first rulers 120 and the second rulers 130 can be fixed.

Then, one side edge of the reference ruler 110 is fit to a side face of the board material 60 as illustrated in Figure 9(b). In this condition, a cut line is marked along the outer edge (or inner edge) of one of the first rulers 120 and the board material 60 is then cut along the cut line. Since the angle formed by one of the first rulers 120 and one of the second ruler 130 which are located on the same side is equal to the external corner angle 70 and the angle formed by the reference ruler 110 and one of the first rulers 120 is one-half the angle formed by one of the first rulers 120 and one of the second rulers 130 on the same side, the end of the board material 60 can be slanted at an angle that is equal to one-half the angle of the external corner angle 70.

In the condition shown in Figure 9(a), the scale division 112b pointed by the notches 142a of the sliding piece 140a located at the leading end is read from the rear side, thereby obtaining the angle formed by one of the first rulers 120 and one of the second rulers 130 on the same side (the right side in Figure 9(a)) and

therefore the external corner angle 70. In this case, the angle formed by the pair of first rulers 120 is equal to the external corner angle 70.

Second Embodiment

Reference is made to Figures 10 to 12 to describe a universal angle jig according to another preferred embodiment of the invention. In Figures 10(a)and 10(b), the universal angle jig of the second embodiment has a pair of first rulers 220 and a pair of second rulers 230. The first rulers 220 are short rulers while the first rulers 120 of the first embodiment being long rulers (the length of the rulers 220 is one-half the length of the rulers 120), and the second rulers 230 are long rulers while the second rulers 130 of the first embodiment being short rulers (the length of the rulers 230 is twice the length of the rulers 130).

More specifically, the length of the first rulers 220 is defined as the distance from the sliding piece 140a and the internal thread 141a positioned on the vertex formed by the first rulers 220 to the respective screws 131 at which the first rulers 220 are coupled to the second rulers 230 respectively. The pair of second rulers 230 extend from their associated screws 131 beyond the sliding piece 140b and the internal thread 141b positioned on the vertex formed by the second rulers 230. The length of the second rulers 230 of the second embodiment is substantially equal to that of the first rulers 130 of the first embodiment.

The universal angle jig of the second embodiment is substantially equivalent or functions substantially similarly to the jig of the first embodiment except the above point. In the description of the second embodiment, like parts are indicated with the same reference numerals as in the first embodiment and a detailed explanation for them is omitted.

For example, where verge rafters are constructed by use of the universal angle jig of the above-described structure according to the second embodiment as illustrated in Figures 11(a) to 11(d), the leading ends of the first rulers 220, that is, the sliding piece 140a inserted therein is allowed to slide so as to be positioned on the leading end of the reference ruler 110 (at that time, the internal thread 141a of the first rulers 220 is slightly tightened), and then, the pair of first rulers 220 are opened to be fit to the roof boards 50 such that the angle formed by the first rulers 220 becomes coincident with the angle of the gable defined by the roof boards 50 as shown in Figure 11(a). At that time, the trailing ends of the pair of second rulers 230 slide backwards along the guide groove 111 of the reference ruler 110, while the pair of first rulers 220 and the pair of second rulers 230 being kept in the form of parallelogram. By tightening the internal thread 141a of the first rulers 220 and the internal thread 141b of the second rulers 230 with the first rulers 220 being fit to the gable defined by the roof boards 50, the parallelogram formed by the first rulers 220 and the second rulers 230 can be fixed.

As shown in Figure 11(b) and Figure 11(c) which is a view taken in the direction of the white arrow of Figure 11(b), one side edge of the reference ruler 110 is fit to a side face of the board material 60 for a verge rafter. In this condition, a cut line is marked along the outer edge (or inner edge) of one of the first rulers 220 or one of the second rulers 230 on the same side. Then, the board material 60 is cut along the cut line. Since the angle formed by the pair of first rulers 220 is equal to the angle of the gable defined by the roof boards 50 and the angle formed by the reference ruler 110 and one of the first rulers 220 or one of the second rulers 230 is one-half the angle formed by the pair of first rulers 220 (in this case, the angle formed by the pair of second rulers 230 is the same as the

angle formed by the pair of first rulers 220), the end of the board material 60 can be slanted at an angle that is one-half the angle of the gable. Another board material 60 is cut in the similar manner. When butting the slant ends of the board materials 60 together, the board materials 60 are fit to each other without a gap, forming an angle coincident with the angle of the gable, as shown in Figure 11(d).

In the condition shown in Figure 11(a), the scale division 112a pointed by the notches 142b of the sliding piece 140b located at the trailing end is read from the rear side, thereby obtaining the angle formed by the pair of first rulers 220.

It should be understood that internal corner angles and half internal corner angles in other cases than the case described above can be readily measured with high accuracy in the similar manner.

As shown in Figures 12(a) and 12(b), when measuring an external corner angle, the trailing ends of the second rulers 230, that is, the sliding piece 140b inserted therein is allowed to slide so as to be positioned at the trailing end of the reference ruler 110 (at that time, the internal thread 141b of the second rulers 230 is slightly tightened), and then, the second rulers 230 are opened to be set such that the open angled part formed by the free ends of the second rulers 230 is fit to the corner having the external corner angle 70 as illustrated in Figure 12(a). At that time, the leading ends of the first rulers 220 slide forwards along the guide groove 111 of the reference ruler 110, while the pair of first rulers 220 and the pair of second rulers 230 being kept in the form of parallelogram described earlier. By tightening the internal thread 141a of the first rulers 220 and the internal thread 141b of the second rulers 230 with the second rulers 230 being thus fit to the corner having the external corner angle 70, the parallelogram formed by the first rulers 220 and the second rulers 230 can be fixed.

Then, one side edge of the reference ruler 110 is fit to a side face of the board material 60 as shown in Figure 12(b). In this condition, a cut line is marked along the outer edge (or inner edge) of one of the second rulers 230 and then, the board material 60 is cut along the cut line (In this case, marking may be carried out based on the first ruler 220 on the same side). Since the angle formed by the pair of second rulers 230 is equal to the external corner angle 70 and the angle formed by the reference ruler 110 and one of the second rulers 230 (or one of the first rulers 220) is one-half the angle formed by the pair of second rulers 230 (or the pair of first rulers 220), the end of the board material 60 can be slanted at an angle that is one-half the external corner angle 70.

In the condition shown in Figure 12(a), the scale division 112b pointed by the notches 142a of the sliding piece 140a located at the leading end is read from the rear side, thereby obtaining the angle formed by the pair of second rulers 230 (or the pair of first rulers 220) and therefore the external corner angle 70.

While the reference ruler 110 having the scale indicia 112a, 112b is used for obtaining an angle as a numeral value in the above-described embodiments, the invention is applicable to cases where the reference ruler 110 does not include the scale indicia 112a, 112b. Although the invention is provided with the reference ruler 110 for tracing an internal or external corner angle and marking a board with a half of the traced angle, the reference ruler 110 may be omitted if it is required for only the purpose of tracing an internal or external corner angle. Even if the reference ruler 110 is omitted, an objective board can be marked with a half of a traced angle, for example, by bringing the sliding pieces 140a, 140b into contact with the objective board.

Industrial Applicability

The universal angle jig of the invention is capable of measuring the internal or external corner angle of any corner portions oriented in various directions and obtaining a half of the measured angle at the same time, without use of special members such as plumb bobs so that marking can be carried out in order to easily, accurately cut an end of a verge rafter, crown molding or skirting board.